

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-123817
 (43)Date of publication of application : 08.05.2001

(51)Int.CI. F01N 1/08

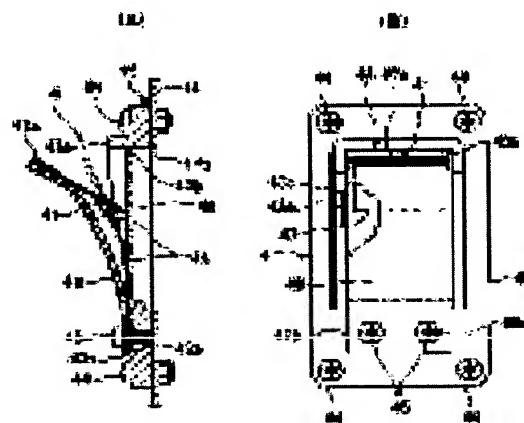
(21)Application number : 11-299430 (71)Applicant : HONDA MOTOR CO LTD
 (22)Date of filing : 21.10.1999 (72)Inventor : KAMIKANE MASAYUKI

(54) VALVE GEAR FOR MUFFLER

(57)Abstract:

PROBLEM TO BE SOLVED: To ensure a stable noise reduction effect by suppressing the opening/ closing vibration of an elastically or flexibly deformable plate valve 43 with one end 43a fixed to a housing 42 having a valve hole in a valve system having the valve 43 for a muffler.

SOLUTION: A leaf spring 47 is positioned with one end obliquely abutting against the open-side face of a plate valve 43. The leaf spring 47 abuts, in an inclined posture, the plate valve 43, so that the place on the plate valve 43 which the leaf spring 47 abuts against is displaced toward one end 43a or the fixed end of the plate valve 43 according as it is flexed in the opening side.



LEGAL STATUS

[Date of request for examination] 26.11.2002

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The bulb equipment for silencers characterized by to be bulb equipment which opens the bypass path of the exhaust gas in a silencer when an exhaust pressure rises to place constant pressure, to have housing which has the valve port to which exhaust gas circulates, and the bulb which opens and closes a valve port, and to have an energization means energize a tabular valve to a closing side, in what is constituted from a tabular valve which could bend elastically, could deform the bulb and fixed the end section to housing.

[Claim 2] The aforementioned energization means is bulb equipment for silencers according to claim 1 characterized by being constituted so that the bending moment by the side of closing given to the aforementioned tabular valve by the energization force of the aforementioned energization means may decrease in connection with the amount of bending by the side of the aperture of a tabular valve increasing.

[Claim 3] Bulb equipment for silencers according to claim 2 characterized by to make flat spring incline to a tabular valve, and to make it contact so that the contact position of the flat spring to a tabular valve may displace to the aforementioned end section side of a tabular valve in connection with the amount of bending by the side of the aperture of a tabular valve increasing to the field by the side of the aperture of the aforementioned tabular valve using the flat spring which an end is made to contact as a composition member of the aforementioned energization means.

[Claim 4] Bulb equipment for silencers according to claim 3 characterized by forming in a stopper member opening by which flat spring is contained when a tabular valve contacts a stopper member, while preparing the stopper member which regulates the bending by the side of the aperture of the aforementioned tabular valve in the regular

position and fixing the other end of the aforementioned flat spring to this stopper member.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the bulb equipment which opens the bypass path of the exhaust gas in a silencer still in detail when an exhaust pressure rises to place constant pressure about the bulb equipment for silencers mainly interposed in the exhaust air system of the engine for vehicles.

[0002]

[Description of the Prior Art] The applicant for this patent had housing which has the valve port to which exhaust gas circulates as this kind of bulb equipment previously by Japanese Patent Application No. No. 110580 [ten to], and Japanese Patent Application No. No. 177414 [ten to], and the bulb which open and close a valve port, could bend elastically, could deform the bulb, and has proposed what constitutes the end section from a tabular valve fixed to housing.

[0003] in addition, with the bulb equipment of Japanese Patent Application No. No. 110580 [ten to] The valve seat section which sits down after the tabular valve has been energized by the elastic stability by bending deformation of self by housing at the closing side is formed. When the exhaust pressure exceeding this elastic stability acts on a tabular valve, a tabular valve bends in an aperture side and a valve port is opened. with the bulb equipment of Japanese Patent Application No. No. 177414 [ten to] When the enclosure wall which encloses a tabular valve in housing and is extended in it at the aperture side of a tabular valve is established, a valve port is constituted from inner circumference space of an enclosure wall and an exhaust pressure exceeds place constant pressure, it bends to the position which a tabular valve encloses and crosses the opening edge of a wall, and the valve port is made to be opened.

[0004]

[Problem(s) to be Solved by the Invention] the above-mentioned *****'s --- **** --- when an exhaust pressure is the pressure of the grade which makes a tabular valve open barely, even if a tabular valve opens, since the opening is small, there are few exhaust air flow rates which pass a tabular valve, therefore the dynamic pressure of an exhaust stream to the extent that the aperture of a tabular valve can be held does

not act on a tabular valve, consequently a tabular valve is closed, the switching action that a tabular valve opens with the static pressure of exhaust air after that again is repeated, and opening-and-closing vibration of a tabular valve is produced. And if such opening-and-closing vibration is produced, the magnitude of attenuation of exhaust sound will be changed and the stable silencing effect will no longer be obtained.

[0005] this invention makes it the technical problem to offer the improvement equipment of the above-mentioned point ** which enabled it to suppress opening-and-closing vibration of a tabular valve in view of the above point.

[0006]

[Means for Solving the Problem] this invention is bulb equipment opened when an exhaust pressure rises the bypass path of the exhaust gas in a silencer to place constant pressure that the above-mentioned technical problem should be solved, was equipped with housing which has the valve port to which exhaust gas circulates, and the bulb which open and close a valve port, it could bend elastically, could deform a bulb and is equipped with an energization means energize a tabular valve to a closing side, in what constitutes the end section from a tabular valve fixed to housing.

[0007] According to this invention, a tabular valve is pressed down by the energization means and the opening-and-closing vibration is suppressed. Here, as for an energization means, it is desirable to constitute so that the bending moment by the side of closing given to a tabular valve by the energization force of an energization means may decrease in connection with the amount of bending by the side of the aperture of a tabular valve increasing. If a tabular valve is opened at a stretch, an exhaust pressure falls conversely and a tabular valve begins to revert to a closing side, in order that the bending moment by the side of closing given by the energization means may decrease, if according to this an exhaust pressure rises and a tabular valve begins to bend in an aperture side, since the bending moment by the side of closing given by the energization means will increase, a tabular valve is closed at a stretch. Thus, a tabular valve switches to an open state and a closed state in an instant, and does not repeat opening and closing by the transient. In this way, opening-and-closing vibration of a tabular valve is suppressed effectively, and the stable silencing effect is obtained.

[0008] In addition, if flat spring is made to incline to a tabular valve and it is made to contact so that the contact position of the flat spring to a tabular valve may displace to the aforementioned end section side of a tabular valve in connection with the amount of bending by the side of the aperture of a tabular valve increasing to the field by the side of the aperture of a tabular valve using the flat spring which an end is

made to contact, the above-mentioned energization means can be constituted only from flat spring, and simplification of structure can be attained.

[0009] Moreover, in order to prevent that a tabular valve bends too much, when preparing the stopper member which regulates the bending by the side of the aperture of a tabular valve in the regular position, it is desirable to fix the other end of flat spring to this stopper member, and to use a stopper member also [mounting bracket / of flat spring]. Here, although a stopper member is formed in the configuration which can distribute the stress of a tabular valve appropriately, if flat spring intervenes between a tabular valve and a stopper member when a tabular valve contacts a stopper member, a tabular valve will stop contacting a stopper member as the configuration of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne., and a stress dispersion effect will fade. In this case, if opening by which flat spring is contained is formed in the stopper member when a tabular valve contacts a stopper member, it will contact soon, without a tabular valve stopper minding flat spring, a stress dispersion effect will fully be demonstrated, and the endurance of a tabular valve will improve.

[0010]

[Embodiments of the Invention] It is the silencer with which 1 is interposed in the middle of the exhaust air system of an internal combustion engine with reference to drawing 1. The tubed shell 11, One pair of the 1st and 2nd separator 14 and 15 is formed in the main part of a silencer which consists of end walls 12 and 13 which blockade the end and the other end of shell 11. the space in a main part The 1st silence room 31 between the end wall 12 and the 1st separator 14, It has divided in the 2nd silence room 32 between the 1st separator 14 and the 2nd separator 15, and the 3rd silence room 33 between the 2nd separator 15 and the other end wall 13.

Furthermore, the exhaust air inhalant canal 21 which penetrates the end wall 12, the 1st separator 14, and the 2nd separator 15 to a silencer 1, respectively, and is open for free passage to it at the 3rd silence room 33, The exhaust air excurrent canal 23 which penetrates the inner pipe 22 which penetrates the 2nd separator 15 and the 1st separator 14, respectively, and opens the 3rd silence room 33 and the 1st silence room 31 for free passage, and the other end wall 13, the 2nd separator 15 and the 1st separator 14, respectively, and is open for free passage in the 1st silence room 31 is formed. And while drilling much bore 21a in the tube wall of 2nd silence room 32 portions of the exhaust air inhalant canal 21, much bore 22a is drilled also in the tube wall of 2nd silence room 32 portions of the inner pipe 22, and the exhaust air inhalant canal 21 and the inner pipe 22 are made into the structure which can be open for free

passage through the 2nd silence room 32.

[0011] According to this, the distribution channel of the exhaust gas which flowed into the exhaust air inhalant canal 21 becomes two lines with the path which results in the exhaust air excurrent canal 23 through the path which results in the exhaust air excurrent canal 23 through the 3rd silence room 33, the inner pipe 22, and the 1st silence room 31, and bore 21a, the 2nd silence room 32, bore 22a, the inner pipe 22 and the 1st silence room 31.

[0012] By the way, if a lot of exhaust gas flows into the exhaust air inhalant canal 21 with high-speed rotation of an internal combustion engine, in the distribution channel of the two above-mentioned exhaust gas, the exhaust pressure in the silence room 32 and 33 will become high, as a result the output of an internal combustion engine will decline.

[0013] For this reason, opening 14a for bypass paths which opens the 2nd silence room 32 and the 1st silence room 31 for free passage to the 1st separator 14 is prepared. When an exhaust pressure rises to place constant pressure, the bulb equipment 4 which opens a bypass path is formed in this opening 14a, and a lot of exhaust gas is made to be discharged by three distribution channels which added the bypass path to the two above-mentioned lines by the atmosphere smoothly in the high rotation region of an internal combustion engine.

[0014] bulb equipment 4 opens and closes the housing 42 which has a valve port 41, and a valve port 41, as shown in drawing 2 -- a bulb -- it bent elastically and has the tabular valve 43 which can deform, and it ****s so that a valve port 41 may agree in the 1st separator 14 at the aforementioned opening 14a, and housing 42 is stopped 44 and carried out

[0015] Housing 42 is formed by the square shape member which consists of forging or a cast, prepares a valve port 41 and bulb fixed part 42b which adjoins this in the center section, ****s end section 43a of a tabular valve 43 to bulb fixed part 42b, and is fixing it by 45. And in housing 42, enclosure wall 42a of the typeface of abbreviation KO surrounding other end 43 of periphery 43 of tabular valve 43 except end section 43a, i.e., tabular valve, b and edges-on-both-sides section 43c is extended from the front face of housing 42 to the aperture side of a tabular valve 43, and the aforementioned valve port 41 consists of inner circumference space of this enclosure wall 42a.

[0016] In addition, although the crevice is made to be secured between the inner skin of enclosure wall 42a, and the periphery of a tabular valve 43 in order to prevent ***** for the switching action of a tabular valve 43, as long as it is located in the

space 41 which the width of face of this crevice is slight, and a tabular valve 43 encloses, and is enclosed by wall 42a, i.e., a valve port, circulation of the exhaust gas in a valve port 41 is intercepted substantially.

[0017] moreover, the stopper of the tabular which regulates the bending by the side of the aperture of a tabular valve 43 — a member 46 is ***** (ed) with a tabular valve 43 in housing 42 with the aforementioned screw thread 45, and it has prevented that a tabular valve 43 bends too much in an aperture side

[0018] According to the above composition, although a tabular valve 43 bends in response to the exhaust pressure in the 2nd silence room 32, while an exhaust pressure is low, the tabular valve 43 is located in a valve port 41, and the valve port 41 is closed substantially. And when the exhaust pressure in the 2nd silence room 32 rises to place constant pressure, it will bend to the position which a tabular valve 43 encloses and crosses the opening edge of wall 42a, a valve port 41 will be opened wide, and exhaust gas will flow for a bypass path.

[0019] Here, with this operation gestalt, the flat spring 47 which works as an energization means to energize a tabular valve 43 to a closing side is formed. as for flat spring 47, the end contacts the field by the side of the aperture of a tabular valve 43 — as — the other end — setting — a stopper — it is fixed to the member 46 And make flat spring 47 incline to a tabular valve 43 in the fixed-end slack end section 43a side of a tabular valve 43, and it is made to contact, and is made for the contact position of the flat spring 47 to a tabular valve 43 to displace to the end section 43a side of a tabular valve 43 in connection with the amount of bending by the side of the aperture of a tabular valve 43 increasing.

[0020] Here, the bending moment by the side of closing is given to a tabular valve 43 by the energization force of flat spring 47. And since the energization force of flat spring 47 does not change like the left to the contact position of the flat spring 47 to a tabular valve 43 displacing like the above, the bending moment by the side of closing given to a tabular valve 43 will decrease in connection with the amount of bending by the side of the aperture of a tabular valve 43 increasing. When an exhaust pressure rises and a tabular valve 43 begins to bend in an aperture side in this way, the bending moment by the side of closing given by flat spring 47 will decrease, consequently a tabular valve 43 will be opened at a stretch. Moreover, when an exhaust pressure falls and a tabular valve 43 begins to bend in a closing side, the bending moment by the side of closing given by flat spring 47 will increase, consequently a tabular valve 43 will be closed at a stretch. Thus, since a tabular valve 43 switches to an open state and a closed state in an instant, opening and closing are not repeated by the transient and

opening-and-closing vibration of a tabular valve 43 is suppressed.

[0021] in addition, the state where the other end of flat spring 47 laid retainer 47a of a tabular on top of the superficies -- a stopper -- it prevents that stress concentrates on the point of a member 46 by spot welding etc. at the fixed point of fixation now *****, and flat spring 47 by retainer 47a, and endurance is raised Moreover, in this operation gestalt, a tabular valve 43 and flat spring 47 were made into this quality of the material (for example, INCO718 (an elevated temperature and high intensity nickel system alloy)), and the board thickness of 0.15mm and flat spring 47 is set as 0.10mm for the board thickness of a tabular valve 43. Thus, board thickness of a tabular valve 43 is made thicker than flat spring 47 for preventing that break, and it bends in the contact part of flat spring 47 as a tabular valve 43 bends.

[0022] Drawing 3 shows the 2nd operation gestalt and gives the same sign as the above-mentioned sign to the same member as the above-mentioned 1st operation gestalt. the 2nd operation gestalt -- a stopper -- the point tooth back of a member 46 -- the other end of flat spring 47 -- fixing -- a stopper -- a member 46 -- a tabular valve 43 -- a stopper -- when a member 46 is contacted, opening 46a by which flat spring 47 is contained is formed

[0023] the thing of the 1st operation gestalt -- a tabular valve 43 -- a stopper -- the state where flat spring 47 was put between members 46 -- a stopper -- although a member 46 is contacted -- the thing of the 2nd operation gestalt -- a tabular valve 43 -- a stopper -- a member 46 is soon contacted without flat spring 47 here -- a stopper -- although a member 46 is formed in the configuration which can distribute the stress of a tabular valve 43 appropriately -- the thing of the 1st operation gestalt -- a tabular valve 43 and a stopper -- since flat spring 47 is put between members 46 -- a stopper -- a tabular valve 43 does not contact a member 46 as the configuration of opposite *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne., but a stress dispersion effect fades on the other hand -- the thing of the 2nd operation gestalt -- a tabular valve 43 -- a stopper -- in order to contact a member 46 soon, a stress dispersion effect is fully demonstrated and the endurance of a tabular valve 43 improves

[0024] As mentioned above, although the operation gestalt which applied this invention to the bulb equipment 4 in which enclosure wall 42a which encloses a tabular valve 43 in housing 42 was formed was explained, this invention is applicable also like the bulb equipment in which the valve seat to which a tabular valve sits down in housing was formed.

[0025]

[Effect of the Invention] Like [from Ming] from the above explanation, according to this invention, the silencing effect which opening-and-closing vibration of a tabular valve could be suppressed, and change of the magnitude of attenuation of exhaust sound was prevented, and was stabilized is obtained, and goods nature improves.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The cross section of an example possessing this invention bulb equipment of a silencer

[Drawing 2] (A) The cross section of the 1st operation gestalt of this invention bulb equipment, the left lateral view of (B) drawing 2 (A)

[Drawing 3] (A) The cross section of the 2nd operation gestalt of this invention bulb equipment, the left lateral view of (B) drawing 3 (A)

[Description of Notations]

1 Silencer 4 Bulb Equipment

41 Valve Port 42 Housing

43 Tabular Valve 43a End Section

46 Stopper -- Member 46a Opening

47 Flat Spring

[Translation done.]

(19)日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開2001-123817

(P2001-123817A)

(43)公開日 平成13年5月8日(2001.5.8)

(51)Int.Cl.⁷

F 01 N 1/08

識別記号

F I

F 01 N 1/08

テーマコード(参考)

A 3 G 0 0 4

Q

審査請求 未請求 請求項の数4 OL (全5頁)

(21)出願番号

特願平11-299430

(22)出願日

平成11年10月21日(1999.10.21)

(71)出願人 000005326

本田技研工業株式会社

東京都港区南青山二丁目1番1号

(72)発明者 上兼 正之

埼玉県和光市中央1丁目4番1号 株式会
社本田技術研究所内

(74)代理人 100060025

弁理士 北村 欣一 (外3名)

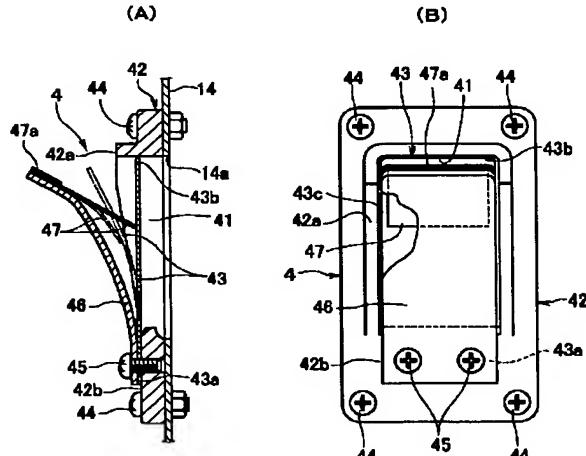
Fターム(参考) 3G004 AA01 CA06 CA11 DA08 DA24
EA02 EA03

(54)【発明の名称】 消音器用バルブ装置

(57)【要約】

【課題】 弁孔41を有するハウジング42に一端部43aを固定した、弾性的に撓み変形可能な板状弁43を有する消音器用バルブ装置において、板状弁43の開閉振動を抑制して、安定した消音効果を得られるようにする。

【解決手段】 板状弁43の開き側の面に一端を当接させる板ばね47を設ける。板ばね47を板状弁43に対し傾斜させて当接させ、板状弁43の開き側への撓み量が増加するのに伴い板状弁43に対する板ばね47の当接位置が板状弁43の固定端たる一端部43a側に変位するように構成する。



【特許請求の範囲】

【請求項1】 消音器内の排気ガスのバイパス経路を排気圧が所定圧に上昇したときに開くバルブ装置であつて、排気ガスが流通する弁孔を有するハウジングと、弁孔を開閉するバルブとを備え、バルブを弾性的に撓み変形可能で一端部をハウジングに固定した板状弁で構成するものにおいて、板状弁を閉じ側に付勢する付勢手段を備えることを特徴とする消音器用バルブ装置。

【請求項2】 前記付勢手段は、前記板状弁に前記付勢手段の付勢力によって付与される閉じ側への曲げモーメントが板状弁の開き側への撓み量が増加するのに伴い減少するように構成されることを特徴とする請求項1に記載の消音器用バルブ装置。

【請求項3】 前記付勢手段の構成部材として前記板状弁の開き側の面に一端を当接させる板ばねを用い、板状弁の開き側への撓み量が増加するのに伴い板状弁に対する板ばねの当接位置が板状弁の前記一端部側に変位するよう、板ばねを板状弁に対し傾斜させて当接させることを特徴とする請求項2に記載の消音器用バルブ装置。

【請求項4】 前記板状弁の開き側への撓みを定位置で規制するストッパ部材を設け、このストッパ部材に前記板ばねの他端を固定すると共に、板状弁がストッパ部材に当接したときに板ばねが収納される開口部をストッパ部材に形成することを特徴とする請求項3に記載の消音器用バルブ装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、主として車両用エンジンの排気系に介設する消音器用のバルブ装置に関し、更に詳細には、消音器内の排気ガスのバイパス経路を排気圧が所定圧に上昇したときに開くバルブ装置に関する。

【0002】

【従来の技術】本願出願人は、先に、この種のバルブ装置として、特願平10-110580号や特願平10-177414号により、排気ガスが流通する弁孔を有するハウジングと、弁孔を開閉するバルブとを備え、バルブを弾性的に撓み変形可能で一端部をハウジングに固定した板状弁で構成するものを提案している。

【0003】尚、特願平10-110580号のバルブ装置では、ハウジングに、板状弁が自己の撓み変形による弾性復元力で閉じ側に付勢された状態で着座する弁座部を形成し、この弾性復元力を上回る排気圧が板状弁に作用したときに板状弁が開き側に撓んで弁孔が開かれるようにし、また、特願平10-177414号のバルブ装置では、ハウジングに、板状弁を囲って板状弁の開き側にのびる囲い壁を設けて、囲い壁の内周空間で弁孔を構成し、排気圧が所定圧を越えたとき板状弁が囲い壁の

開口端を越える位置まで撓んで弁孔が開かれるようにしている。

【0004】

【発明が解決しようとする課題】上記先願のものでは、排気圧が板状弁をかろうじて開かせる程度の圧力である場合、板状弁が開いてもその開度が小さいため板状弁を通過する排気流量は少なく、そのため、板状弁の開きを保持できる程の排気流の動圧は板状弁に作用せず、その結果、板状弁は閉じ、その後再び排気の静圧により板状弁が開くという開閉動作を繰返し、板状弁の開閉振動を生ずる。そして、このような開閉振動を生ずると、排気音の減衰量が変動し、安定した消音効果が得られなくなる。

【0005】本発明は、以上の点に鑑み、板状弁の開閉振動を抑制し得るようにした、上記先願の改良装置を提供することを課題としている。

【0006】

【課題を解決するための手段】上記課題を解決すべく、本発明は、消音器内の排気ガスのバイパス経路を排気圧が所定圧に上昇したときに開くバルブ装置であつて、排気ガスが流通する弁孔を有するハウジングと、弁孔を開閉するバルブとを備え、バルブを弾性的に撓み変形可能で一端部をハウジングに固定した板状弁で構成するものにおいて、板状弁を閉じ側に付勢する付勢手段を備えている。

【0007】本発明によれば、付勢手段により板状弁が押え付けられてその開閉振動が抑制される。ここで、付勢手段は、板状弁に付勢手段の付勢力によって付与される閉じ側への曲げモーメントが板状弁の開き側への撓み量が増加するのに伴い減少するよう構成することが望ましい。これによれば、排気圧が上昇して板状弁が開き側に撓み出すと、付勢手段により付与される閉じ側への曲げモーメントが減少するため、板状弁は一気に開き、逆に、排気圧が低下して板状弁が閉じ側に復元し出すと、付勢手段により付与される閉じ側への曲げモーメントが増加するため、板状弁は一気に閉じる。このように、板状弁は開状態と閉状態とに瞬時に切換わり、過渡状態で開閉を繰返すことがない。かくて、板状弁の開閉振動が効果的に抑制され、安定した消音効果が得られる。

【0008】尚、板状弁の開き側の面に一端を当接させる板ばねを用い、板状弁の開き側への撓み量が増加するのに伴い板状弁に対する板ばねの当接位置が板状弁の前記一端部側に変位するよう、板ばねを板状弁に対し傾斜させて当接させれば、板ばねだけで上記付勢手段を構成でき、構造の簡素化を図れる。

【0009】また、板状弁が過度に撓むことを防止するため、板状弁の開き側への撓みを定位置で規制するストッパ部材を設ける場合、このストッパ部材に板ばねの他端を固定し、ストッパ部材を板ばねの取付ブラケットに

兼用することが望ましい。ここで、ストッパ部材は、板状弁の応力を適切に分散できるような形状に形成するが、板状弁がストッパ部材に当接するとき、板状弁とストッパ部材との間に板ばねが介在すると、ストッパ部材に対しその形状通りに板状弁が当接しなくなり、応力分散効果が薄れる。この場合、板状弁がストッパ部材に当接したときに板ばねが収納される開口部をストッパ部材に形成しておけば、板状弁がストッパ部材に板ばねを介さずに直に当接し、応力分散効果が充分に発揮されて、板状弁の耐久性が向上する。

【0010】

【発明の実施の形態】図1を参照して、1は内燃機関の排気系の途中に介設される消音器であり、筒状のシェル11と、シェル11の一端と他端とを閉塞する端壁12、13とで構成される消音器本体内に、第1と第2の1対のセパレータ14、15を設け、本体内の空間を、一端壁12と第1セパレータ14との間の第1消音室31と、第1セパレータ14と第2セパレータ15との間の第2消音室32と、第2セパレータ15と他端壁13との間の第3消音室33とに区割している。更に、消音器1に、一端壁12と第1セパレータ14と第2セパレータ15とを夫々貫通して第3消音室33に連通する排気流入管21と、第2セパレータ15と第1セパレータ14とを夫々貫通して第3消音室33と第1消音室31とを連通するインナーパイプ22と、他端壁13と第2セパレータ15と第1セパレータ14とを夫々貫通して第1消音室31に連通する排気流出管23とを設けている。そして、排気流入管21の第2消音室32部分の管壁に多数の透孔21aを穿設すると共に、インナーパイプ22の第2消音室32部分の管壁にも多数の透孔22aを穿設して、排気流入管21とインナーパイプ22とを第2消音室32を介して連通できる構造にしている。

【0011】これによれば、排気流入管21に流入した排気ガスの流通経路は、第3消音室33とインナーパイプ22と第1消音室31とを介して排気流出管23に至る経路と、透孔21aと第2消音室32と透孔22aとインナーパイプ22と第1消音室31とを介して排気流出管23に至る経路との2系統になる。

【0012】ところで、内燃機関の高速回転に伴って多量の排気ガスが排気流入管21に流入すると、上記2系統だけの排気ガスの流通経路では消音室32、33内の排気圧が高くなり、ひいては、内燃機関の出力が低下する。

【0013】このため、第1セパレータ14に、第2消音室32と第1消音室31とを連通するバイパス経路用の開口部14aを設け、この開口部14aに、排気圧が所定圧に上昇したときにバイパス経路を開くバルブ装置4を設け、内燃機関の高回転域では、上記した2系統にバイパス経路を追加した3系統の流通経路で多量の排気ガスが大気にスムーズに排出されるようにしている。

【0014】バルブ装置4は、図2に示すように、弁孔41を有するハウジング42と、弁孔41を開閉するバルブたる、弾性的に撓み変形可能な板状弁43とを備えており、ハウジング42を第1セパレータ14に弁孔41が前記開口部14aに合致するようにねじ44止めしている。

【0015】ハウジング42は、鍛造または鋳造品から成る角形部材で形成され、その中央部に弁孔41と、これに隣接するバルブ固定部42bとを設け、板状弁43の一端部43aをバルブ固定部42bにねじ45で固定している。そして、ハウジング42に、一端部43aを除く板状弁43の周縁、即ち、板状弁43の他端部43b及び両側縁部43cを囲む略Cの字形の囲い壁42aを、ハウジング42の表面から板状弁43の開き側に延出し、この囲い壁42aの内周空間で前記弁孔41を構成している。

【0016】尚、囲い壁42aの内周面と板状弁43の周縁との間には、板状弁43の開閉動作に際してのこじりを防止するために隙間が確保されるようにしているが、この隙間の幅は僅かであり、板状弁43が囲い壁42aで囲われる空間、即ち、弁孔41内に位置する限り、弁孔41における排気ガスの流通は実質的に遮断される。

【0017】また、板状弁43の開き側への撓みを規制する板状のストッパ部材46を前記ねじ45でハウジング42に板状弁43と共に共締めし、板状弁43が開き側に過度に撓むことを防止している。

【0018】以上の構成によれば、第2消音室32内の排気圧を受けて板状弁43が撓むが、排気圧が低いうちは板状弁43が弁孔41内に位置しており、弁孔41は実質的に閉鎖されている。そして、第2消音室32内の排気圧が所定圧に上昇すると、板状弁43が囲い壁42aの開口端を越える位置まで撓んで弁孔41が開放され、排気ガスがバイパス経路に流れることになる。

【0019】ここで、本実施形態では、板状弁43を閉じ側に付勢する付勢手段として働く板ばね47を設けている。板ばね47は、その一端が板状弁43の開き側の面に当接するように、その他端においてストッパ部材46に固定されている。そして、板ばね47を板状弁43に対し板状弁43の固定端たる一端部43a側に傾斜させて当接させ、板状弁43の開き側への撓み量が増加するのに伴い板状弁43に対する板ばね47の当接位置が板状弁43の一端部43a側に変位するようにしている。

【0020】ここで、板状弁43には、板ばね47の付勢力により閉じ側への曲げモーメントが付与される。そして、板状弁43に対する板ばね47の当接位置が上記の如く変位するのに対し板ばね47の付勢力は左程変化しないため、板状弁43に付与される閉じ側への曲げモーメントは板状弁43の開き側への撓み量が増加するの

に伴い減少することになる。かくて、排気圧が上昇して板状弁43が開き側に撓み出すと、板ばね47により付与される閉じ側への曲げモーメントが減少し、その結果、板状弁43は一気に開くことになる。また、排気圧が低下して板状弁43が閉じ側に撓み出すと、板ばね47により付与される閉じ側への曲げモーメントが増加し、その結果、板状弁43は一気に閉じることになる。このように、板状弁43は開状態と閉状態とに瞬時に切換わるため、過渡状態で開閉を繰り返すことがなく、板状弁43の開閉振動が抑制される。

【0021】尚、板ばね47の他端は、その外面に板状のリテーナ47aを重ね合わせた状態でストップ部材46の先端部にスポット溶接等で固定されており、板ばね47の固定点に応力が集中することをリテーナ47aで防止して、耐久性を向上させている。また、本実施形態において、板状弁43と板ばね47とは同材質（例えばINC0718（高温・高強度ニッケル系合金））とし、板状弁43の板厚を例えば0.15mm、板ばね47の板厚を例えば0.10mmに設定している。このように板状弁43の板厚を板ばね47よりも厚くするのは、板状弁43が板ばね47の当接箇所で折れ曲るようにして撓むことを防止するためである。

【0022】図3は第2実施形態を示しており、上記第1実施形態と同一の部材には上記符号と同一の符号を付している。第2実施形態では、ストップ部材46の先端部背面に板ばね47の他端を固定し、ストップ部材46に、板状弁43がストップ部材46に当接したときに板ばね47が収納される開口部46aを形成している。

【0023】第1実施形態のものでは、板状弁43がストップ部材46との間に板ばね47を挟み込んだ状態でストップ部材46に当接するが、第2実施形態のものは、板状弁43がストップ部材46に板ばね47を介さ

ず直に当接する。ここで、ストップ部材46は、板状弁43の応力を適切に分散できるような形状に形成するが、第1実施形態のものでは、板状弁43とストップ部材46との間に板ばね47が挟み込まれるため、ストップ部材46に対しその形状通りに板状弁43が当接せず、応力分散効果が薄れる。一方、第2実施形態のものでは、板状弁43がストップ部材46に直に当接するため、応力分散効果が充分に発揮され、板状弁43の耐久性が向上する。

【0024】以上、ハウジング42に板状弁43を囲う囲い壁42aを形成したバルブ装置4に本発明を適用した実施形態について説明したが、ハウジングに板状弁が着座する弁座を形成したバルブ装置にも同様に本発明を適用できる。

【0025】

【発明の効果】以上のお説明から明からように、本発明によれば、板状弁の開閉振動を抑制でき、排気音の減衰量の変動が防止されて安定した消音効果が得られ、商品性が向上する。

【図面の簡単な説明】

【図1】 本発明バルブ装置を具備する消音器の一例の断面図

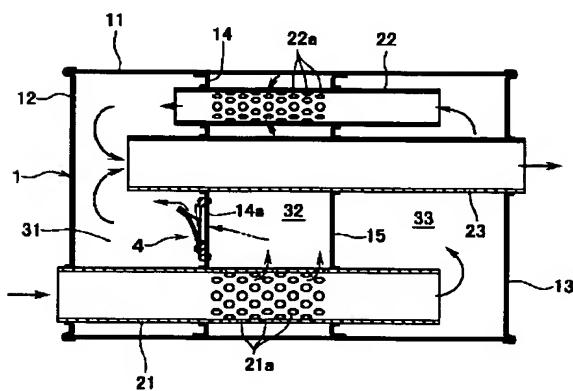
【図2】 (A) 本発明バルブ装置の第1実施形態の断面図、(B) 図2(A)の左側面図

【図3】 (A) 本発明バルブ装置の第2実施形態の断面図、(B) 図3(A)の左側面図

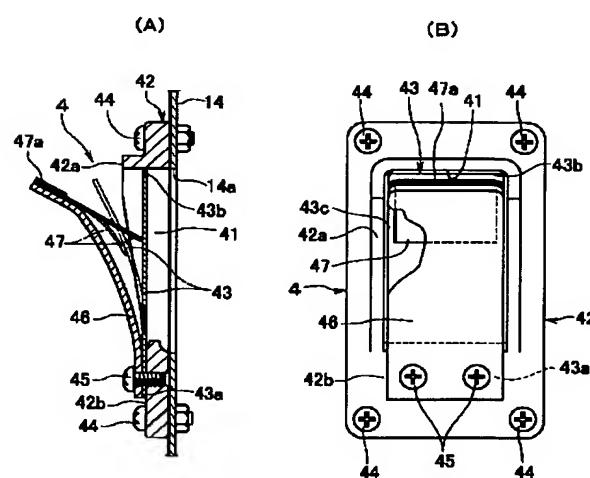
【符号の説明】

1 消音器	4 バルブ装置
41 弁孔	42 ハウジング
43 板状弁	43a 一端部
46 ストップ部材	46a 開口部
47 板ばね	

【図1】



【図2】



【図3】

